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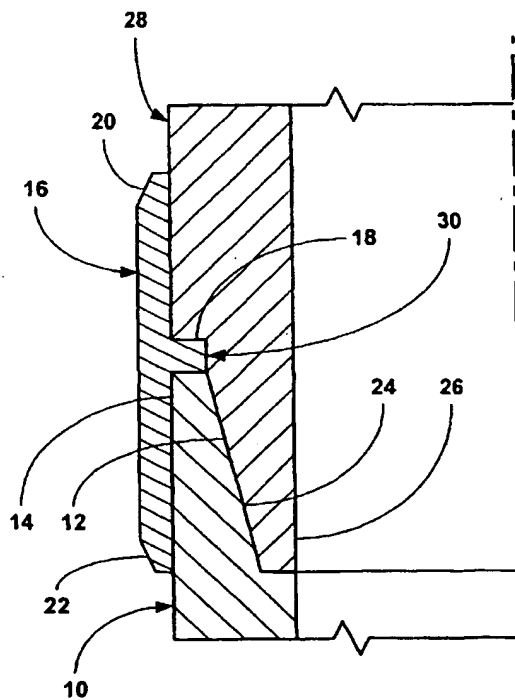
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[Continued on next page]

(54) Title: PROTECTIVE SLEEVE FOR THREADED CONNECTIONS FOR EXPANDABLE LINER HANGER



(57) Abstract: A tubular sleeve (16) is coupled to and overlaps the threaded connection between a pair of adjacent tubular members (10 and 28). The adjacent tubular members (10 and 28) are then radially expanded and plastically deformed.

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CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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Declaration under Rule 4.17:

- *of inventorship (Rule 4.17(iv)) for US only*

Published:

- *with international search report*
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/19993

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : E21B 19/16,7/00,29/10; F16L 21/00

US CL : 166/380,277,242.2,250.08;175/40,57;285/370;73/152.54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Continuation Sheet

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------------|
| X | US 2002/0066578 A1 (Broome) 06 June 2002 (06.06.2002), see Figures. | 1,6-9,16-18,28-38,43-46,50- |
| --- | | 53,58,59,61,63,64,76- |
| Y | | 85,92-94,104- |
| | | 109,114,115,118,119,125,127 |
| | | ----- |
| | | 2-5,10-15,19-24,39- |
| | | 41,49,54-57,86-91,95- |
| | | 100,110-112,128- |
| | | 130,132,134- |
| | | 137,139,141-166 |

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z"

document member of the same patent family

Date of the actual completion of the international search

17 December 2003 (17.12.2003)

Date of mailing of the international search report

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Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

PCT/US03/19993

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---------------|---|---|
| X --- Y | US 4,328,983 A (Gibson) 11 May 1982 (11.05.1982), see Figures. | 10-15, 19- 24, 60, 62, 64-75, 85- 91, 95-100, 120- 124, 126 ----- 39-41, 110- 112, 131, 133, 138, 140 |
| Y | US 5,975,587 A (Wood et al.) 02 November 1999 (02.11.1999), see Figures and Abstract. | 39-41, 110-112 |
| Y | US 5,862,866 A (Springer) 26 January 1999 (26.01.1999), see col. 8, lines 40-60. | 128-141, 159-166 |
| Y | US 5,584,512 A (Carstensen) 17 December 1996 (17.12.1996), see col. 6, lines 25-55. | 142-151 |
| A | US 6,406,063 B1 (Pfeiffer) 18 June 2002 (18.06.2002), see Figures. | 1-166 |
| A | US 5,360,239 A (Klementich) 01 November 1994 (01.11.1994), see Figures. | 1-166 |
| A | US 5,895,079 A (Carstensen et al.) 20 April 1999 (20.04.1999), see Figures. | 1-166 |
| A | US 6,231,086 B1 (Tierling) 15 May 2001 (15.05.2001), see Figures. | 1-166 |
| A | US 4,832,382 A (Kappan) 23 May 1989 (23.05.1989), see Figures. | 1-166 |

INTERNATIONAL SEARCH REPORT

PCT/US03/19993

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-63 and 145-166, drawn to a method for coupling tubulars and expanding the tubulars.

Group II, claim(s) 64-127, drawn to a tubing coupling.

Group III, claim(s) 128-140, drawn to a method and apparatus for extracting geothermal energy from a subterranean source of geothermal energy.

Group IV, claim(s) 142-144, drawn to a method for pressure testing tubing.

The inventions listed as Groups I-IV do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I is not required to be used in a pressure testing procedure or in the extracting of geothermal energy. Group II does not include expanding the tubing coupling and is not required to be used in a pressure testing procedure or in the extracting of geothermal energy. Group III does not include the pressure testing procedure. Group IV is not used in the extraction of geothermal energy nor does it include the specifics of the tubing coupling.

Continuation of B. FIELDS SEARCHED Item 1:

166/380,277,242.2,250.08,207,208,242.1,242.6,269,250.01,66;175/40,57,24;285/370,65,66,328,330,332,334.1,334.5,345,363,369,371,365,405,407;73/152.54,152.51,152.55

Continuation of B. FIELDS SEARCHED Item 3:

EAST

search terms: sleeve, flange, lip, shoulder, wellbore, threaded coupling, threaded connector, geothermal, pressure testing

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/19993

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☐

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.